

WHAT IS CLAIMED IS:

1. A modulation method comprising the steps of:
generating a 6-bit output code word in response to every 4-bit
5 input code word by referring to a set of encoding tables, wherein
the encoding tables contain output code words assigned to input
code words, and contain encoding-table designation information
accompanying each output code word, wherein the encoding-table
designation information designates an encoding table among the
10 encoding tables which is used next to generate an output code word
immediately following the output code word accompanied with the
encoding-table designation information; and
sequentially connecting the generated output code words into
a sequence of the generated output code words which follows
15 predetermined run length limiting rules (1, k)RLL, where "k"
denotes a predetermined natural number between 7 and 12.
2. A modulation method as recited in claim 1, wherein NRZI
conversion results of output code words in first specified one of the
20 encoding tables which are assigned to prescribed input code words
are opposite in polarity to NRZI conversion results of output code
words in second specified one of the encoding tables which are
assigned to the prescribed input code words, and further
comprising the steps of generating a first candidate current output
25 code word in response to a current input code word equal to one of
the prescribed input code words by referring to the first specified

one of the encoding tables, and generating a second candidate current output code word in response to the current input code word equal to said one of the prescribed input code words by referring to the second specified one of the encoding tables,

5 wherein a succession of a specified immediately-preceding output code word and the first candidate current output code word and also a succession of the specified immediately-preceding output code word and the second candidate current output code follow the predetermined run length limiting rules (1, k)RLL.

10

3. A modulation method as recited in claim 2, further comprising the step of selecting one from the first and second candidate current output code words as a final current output code word.

15

4. A modulation method as recited in claim 2, further comprising the steps of:

calculating a first CDS of the first candidate current output code word;

20 updating a first DSV of the first candidate current output code word and previous final output code words in response to the first CDS;

calculating a second CDS of the second candidate current output code word;

25 updating a second DSV of the second candidate current output code word and previous final output code words in response to the

second CDS;

determining which of an absolute value of the first DSV and an absolute value of the second DSV is smaller; and

selecting one from the first and second candidate current

5 output code words which corresponds to the smaller DSV absolute value as a final current output code word.

5. A modulation method as recited in claim 1, further comprising the steps of:

10 predicting repetition of a minimum run length at least a predetermined number of times in the sequence of the generated output code words; and

when the repetition of the minimum run length is predicted, changing an output code word causing the repetition to prevent the
15 repetition of the minimum run length from occurring in the sequence of the generated output code words.

6. A modulation apparatus comprising:

means for generating a 6-bit output code word in response to
20 every 4-bit input code word by referring to a set of encoding tables, wherein the encoding tables contain output code words assigned to input code words, and contain encoding-table designation information accompanying each output code word, wherein the encoding-table designation information designates an encoding table
25 among the encoding tables which is used next to generate an output code word immediately following the output code word

accompanied with the encoding-table designation information; and

means for sequentially connecting the generated output code words into a sequence of the generated output code words which follows predetermined run length limiting rules (1, k)RLL, where

5 "k" denotes a predetermined natural number between 7 and 12.

7. A modulation apparatus as recited in claim 6, wherein NRZI conversion results of output code words in first specified one of the encoding tables which are assigned to prescribed input code words

10 are opposite in polarity to NRZI conversion results of output code words in second specified one of the encoding tables which are assigned to the prescribed input code words, and further

comprising means for generating a first candidate current output code word in response to a current input code word equal to one of the prescribed input code words by referring to the first specified one of the encoding tables, and means for generating a second candidate current output code word in response to the current input code word equal to said one of the prescribed input code words by referring to the second specified one of the encoding

20 tables, wherein a succession of a specified immediately-preceding output code word and the first candidate current output code word and also a succession of the specified immediately-preceding output code word and the second candidate current output code follow the predetermined run length limiting rules (1, k)RLL.

25

8. A modulation apparatus as recited in claim 7, further

comprising means for selecting one from the first and second candidate current output code words as a final current output code word.

- 5 9. A modulation apparatus as recited in claim 7, further comprising:

 means for calculating a first CDS of the first candidate current output code word;

- means for updating a first DSV of the first candidate current
10 output code word and previous final output code words in response to the first CDS;

 means for calculating a second CDS of the second candidate current output code word;

- means for updating a second DSV of the second candidate
15 current output code word and previous final output code words in response to the second CDS;

 means for determining which of an absolute value of the first DSV and an absolute value of the second DSV is smaller; and

- means for selecting one from the first and second candidate
20 current output code words which corresponds to the smaller DSV absolute value as a final current output code word.

10. A modulation apparatus as recited in claim 6, further comprising:

- 25 means for predicting repetition of a minimum run length at least a predetermined number of times in the sequence of the

generated output code words; and

means for, when the repetition of the minimum run length is predicted, changing an output code word causing the repetition to prevent the repetition of the minimum run length from occurring in the sequence of the generated output code words.

11. A demodulation method of demodulating a sequence of 6-bit code words which is generated by the modulation method in claim 1, the demodulation method comprising the steps of:

10 recovering encoding-table designation information from the code-word sequence, the encoding-table designation information representing which of encoding tables has been used in generating a code word immediately following a code word of interest; and
demodulating the code word of interest into an original code
15 word by referring to a decoding table in response to the recovered encoding-table designation information.

12. A demodulation apparatus for demodulating a sequence of 6-bit code words which is generated by the modulation apparatus in claim 6, the demodulation apparatus comprising:

means for recovering encoding-table designation information from the code-word sequence, the encoding-table designation information representing which of encoding tables has been used in generating a code word immediately following a code word of
25 interest; and

means for demodulating the code word of interest into an

10

13. An information recording medium storing a sequence of code words which is generated by the modulation apparatus in claim 6.
14. An information transmission method of transmitting a sequence of code words which is generated by the modulation method in claim 1.
15. An information transmission apparatus for transmitting a sequence of code words which is generated by the modulation apparatus in claim 6.